ACQUISITION PROGRAM BASELINE

FOR THE

INTEGRATED TERMINAL WEATHER SYSTEM (ITWS)

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

June 2, 1997

FAE ENDORSEMENT OF ACQUISITION PROGRAM BASELINE REQUEST

Subject: Integrated Terminal Weather System (ITWS) Baseline Change Request

The ITWS requires a change to its current approved baseline, dated 5/1/95.

- The performance parameters have been revised to reflect the capabilities of current prototype operations.
- The cost baseline has been lowered due to a higher level of software reuse and productivity by the selected ITWS prime contractor.
- The schedule has been adjusted to reflect budget constraints and a delay in contract award.
- The benefits baseline has been added.

Accordingly new baseline parameters are attached.

I endorse the baseline change.

Submitted By:

_____

Integrated Product Team Lead Date

_____

Sponsoring Organization Date

Concurrence By:

_____

Director, Investment Analysis Staff Date

Approved By:

_____

FAA Acquisition Executive Date

SECTION A: PERFORMANCE

Approved: 6/2/97

Top Level Parameters

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
Availability	0.999	0.999	0.99981	0.99981	No change (nc)	nc
Reliability	2190 hours mean time between failures (MTBF)	2190 hours MTBF	nc	nc	nc	nc
Coverage Area	Surface - 18,000 ft above ground level (AGL) 60 nautical mile (nmi) radius from airport reference point (ARP)	Surface - 18,000 ft AGL, 60 nmi radius from ARP	Surface-23,000 feet AGL out to 30 nmi beyond the TRACON boundary, product dependent	Surface-23,000 feet AGL out to 30 nmi beyond the TRACON boundary, product dependent	nc	nc
Retention	6 hour off-line storage	6 hour off-line storage	6 hours of input data	6 hours of input data	nc	nc
Data Archive	15 day off-line storage	15 day off-line storage	15 days of ITWS products directly supporting display or user output	15 days of ITWS products directly supporting display or user output	nc	nc

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
Automatic recovery on ITWS generation failure	Parameter not specified	Parameter not specified	Switch to TDWR display within 30 seconds of ITWS wind shear product outage	Switch to TDWR display within 30 seconds of ITWS wind shear product outage	nc	nc
Timeliness of reporting weather phenomenon (tornado, hail, mesocyclone)	Parameter not specified	Parameter not specified	≤ 1 minute of receipt of applicable data	≤ 1 minute of receipt of applicable data	nc	nc

The ITWS will provide the following Detected and Predictive Products:

Wind Shear and Storm Products: The ITWS will provide wind shear and storm products that include microburst prediction, gust front forecasts, storm motion, storm extrapolated position, storm cell information, and ASR-9 anomalous propagation editing. These products will be generated with the following parameters:

Wind Shear and Storm Products Parameters

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
Wind Shear						
Horizontal Resolution	1 nmi	0.5 nmi	Parameter deleted	Parameter deleted	1 nmi (parameter reinstated)	0.5 nmi (parameter reinstated)
Probability of Detection	greater than 90%	greater than 95%	Parameter deleted	Parameter deleted	greater than 90% (parameter reinstated)	greater than 95% (parameter reinstated)
Probability of False Alarm	less than 10%	less than 5%	Parameter deleted	Parameter deleted	less than 10% (parameter reinstated)	less than 5% (parameter reinstated)
Graphic Resolution	1 minute advance warning for aircraft approaching a wind shear in a runway corridor, 70% of the time	1 minute advance warning for aircraft approaching a wind shear in a runway corridor, 90% of the time	Parameter deleted	Parameter deleted	1 minute advance warning for aircraft approaching a wind shear in a runway corridor, 70% of the time (parameter reinstated)	1 minute advance warning for aircraft approaching a wind shear in a runway corridor, 90% of the time (parameter reinstated)
Microburst prediction						
a) Probability of false microburst alert	Parameter not specified	Parameter not specified	≤ 0.1	≤ 0.05	nc	nc

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
b) Prediction lead time	Parameter not specified	Parameter not specified	≤ 2 minutes, prior to onset of microburst for 60% of predicted valid wet microbursts	≤ 2 minutes, prior to onset of divergent wind shear for 90% of predicted events	nc	nc
Gust Front Forecast						
a) Predicted position time	Parameter not specified	Parameter not specified	Position predicted 10 minutes and 20 minutes in advance	Position predicted 10 minutes and 20 minutes in advance	nc	nc
b) Predicted position accuracy	Parameter not specified	Parameter not specified	Predict 70% of gust fronts impacting airport with wind change ≥ 15 knots 10 minutes in advance	Predict 90% of gust fronts impacting airport with wind change ≥ 15 knots 10 minutes in advance	nc	nc
c) Probability of false prediction	Parameter not specified	Parameter not specified	Probability of false 10 minute prediction ≤ 0.10 for gust fronts with wind change ≥ 15 knots	Probability of false 10 minute prediction ≤ 0.10 for gust fronts with wind change ≥ 15 knots	nc	nc
Storm motion						
a) Storm speed accuracy	Parameter not specified	Parameter not specified	±5 knots for 90% of storm events moving at ≥ 10 knots	±5 knots for 90% of storm events moving at ≥ 5 knots	nc	nc
b) Storm direction	Parameter not	Parameter not	±20 degrees for	±20 degrees knots	nc	nc

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
	specified	specified	90% of storms moving at ≥ 10 knots	for 90% of storms moving at ≥ 5 knots and ±10 degrees for 50% of storms moving at ≥ 5 knots		
Storm extrapolated position						
a) Extrapolated position times	Parameter not specified	Parameter not specified	Position projected 10 minutes and 20 minutes in advance	Position projected 10 minutes and 20 minutes in advance	nc	nc
b) Extrapolated position accuracy	Parameter not specified	Parameter not specified	10-minute extrapolation within 2 nm for 80% of storms moving at speeds > 10 knots, excluding storms with growth, decay ≥ 2 levels (TRACON product)	20-minute extrapolation within 2 nm for 70% of storms moving at speeds > 10 knots (TRACON product)	nc	nc
Storm cell information — Storm cell association	Parameter not specified	Parameter not specified	≥ 90% of features associated to correct cell	≥ 95% of features associated to correct cell	nc	nc

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
ASR-9 AP edit						
a) Inadvertent edit	Parameter not specified	Parameter not specified	≤ a maximum of 10 km² or 10% of contiguous area with weather reflectivity ≥ level 3	≤ a maximum of 10 km² or 10% of contiguous area with weather reflectivity ≥ level 2	nc	nc
b) Latency	Parameter not specified	Parameter not specified	≤ 30 seconds of ASR-9 update	≤ 30 seconds of ASR-9 update	nc	nc
c) Edit performance	Parameter not specified	Parameter not specified	Edit 70% of AP when ASR-9 level is ≥ level 3 and ≥ 2 levels over actual reflectivity level, & AP ≥ 25 km²	Edit 85% of AP when ASR-9 level is ≥ level 3 and ≥ 2 levels over actual reflectivity level, & AP ≥ 25 km²	nc	nc

Weather Impacted Airspace Products Parameters

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3	CHANGE # 2 / 6/2/97 JRC
Horizontal Resolution	0.5 - 1.0 nmi	0.5 nmi	Parameter deleted	nc
Position Accuracy	1 - 2 nmi, 70% of occurrences	within 1 nmi, 90% of occurrences	Parameter deleted	nc
Update Rate	1 - 2 per minute	2 per minute	Parameter deleted	nc

Ceiling and Visibility Products Parameters

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3	CHANGE # 2 / 6/2/97 JRC
Horizontal Resolution	2 - 4 nmi	2 nmi	Parameter deleted	nc
Probability of Detection	80 - 90%	greater than 90%	Parameter deleted	nc
Accuracy	• ±100 ft (visibility) • ±5% (ceiling height) AGL • ±15% (cloud cover percent) 70% of occurrences	• ±100 ft (visibility) • ±5% (ceiling height) AGL • ±15% (cloud cover percent) 90% of occurrences	Parameter deleted	nc
Update Rate	1 per 10-15 minutes	1 per 5 minutes	Parameter deleted	nc

Winds Products: The ITWS will provide wind products that include gridded wind fields and wind profiles for the terminal area. These products will be generated with the following parameters:

Winds Products Parameters

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
Resolution	• 100 ft vertical (Approach and Departure corridor) • 250 ft vertical (0 - 3000 ft Terminal area) • 1000 ft vertical (3 - 18,000 ft Terminal area) • 1 nmi (horizontal	• 100 ft vertical (Approach and Departure corridor) • 250 ft vertical (0 - 3000 ft Terminal area) • 1000 ft vertical (3 - 18,000 ft Terminal area) • 1 nmi (horizontal)	Parameter deleted	Parameter deleted	nc	nc

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
Accuracy	• ±10 - 15 knots along routes in use during IMC corridors (with TDWR and NEXRAD) • ±4 - 8 knots approach and departure corridor (with TDWR and NEXRAD) • Accuracy of AGFS data in all areas without TDWR and NEXRAD 70% of the time	• ±10 knots along routes in use during IMC corridors (with TDWR and NEXRAD) • ±4 knots approach and departure corridor (with TDWR) • Accuracy of AGFS data in all areas without TDWR and NEXRAD 90% of the time	Parameter deleted	Parameter deleted	nc	nc
Update Rate	1 per 5 - 10 minutes	1 per 5 minutes	Parameter deleted	Parameter deleted	nc	nc
Terminal winds						
a) Horizontal resolution	Parameter not specified	Parameter not specified	±5 nmi out to 30 nm beyond TRACON ≤ 23000 feet	±1 nmi within TRACON boundaries ≤ 18000 feet; 5 nmi elsewhere	nc	nc

CRITICAL PARAMETER	THRESHOLD	OBJECTIVE	CHANGE # 1 / KDP # 3		CHANGE # 2 / 6/2/97 JRC	
			THRESHOLD	OBJECTIVE	THRESHOLD	OBJECTIVE
b) Vertical resolution (between levels)	Parameter not specified	Parameter not specified	50 millibars	25 millibars < 5000 feet AGL and ≤ 15 nm of the TDWR radar; 50 mb elsewhere	nc	nc
c) Accuracy	Parameter not specified	Parameter not specified	±10 knots 80% of time in regions and at times when both TDWR and NEXRAD have valid velocity data	±5 knots 90% of time in regions and at times when both TDWR and NEXRAD have valid velocity data	nc	nc

SECTION B: COST

Approved: 6/2/97

Cost Estimate	Range	CHANGE # 1 / KDP # 3	CHANGE # 2 / 6/2/97 JRC
Overall Program			
Then Year $			
	(millions)	(millions)	(millions)
Total RDT&E	$105.5 - $159.2	$130.8 - $168.8	Parameter Deleted
Total Acquisition	$250.9 - $369.0	$197.5 - $265.2	Parameter Deleted
IOC F&E	Parameter Added	Parameter Added	$173.0
P^3I F&E	Parameter Added	Parameter Added	$103.0
Total F&E	Parameter Added	Parameter Added	$276.1*
IOC Ops	Parameter Added	Parameter Added	$122.8
P^3I Ops	Parameter Added	Parameter Added	$ 19.5
Total Ops	Parameter Added	Parameter Added	$142.3

*Total does not equal $276.0 due to rounding.

Total Quantities: Acquire 37 systems total. Of these, 34 are to be operational systems at TRACONs serving 45 terminals, and the remaining 3 are to be installed at the Mike Monroney Aeronautical Center, at the FAA Technical Center, and at the ITWS Program Support Facility.

Cost ranges are based on an AOR cost analysis “most likely” and “worst case” estimates.

SECTION C: SCHEDULE (DATES)

Approved: 6/2/97

Critical Events	Range	CHANGE #1, KDP # 3	CHANGE # 2 / 6/2/97 JRC
Pre–DEMVAL Operations	Apr 93 – Oct 93	nc	nc
Dallas–Ft. Worth DEMVAL	May 94 – Aug 94	Parameter Deleted	nc
Memphis and Orlando DEMVAL	Parameter Added	May 94 – Sep 94	May 94 – Aug 94*
KDP–3	Sep 94 – Jan 95	Apr 95 – May 95	Apr 95*
"A" Specification	Aug 94 – Dec 94	Jun 95 – Jul 95	Jul 95*
RFP Release for Full–Scale Development	Dec 94 – Apr 95	Aug 95 – Sep 95	Jan 96*
Contract Award	Mar 96 – Jul 96	Aug 96 – Oct 96	Jan 97*
Critical Design Review	Jun 96 – Oct 96	Oct 97 – Feb 98	Jul 98 – Jan 99
OT&E Completed	Feb 99 – Aug 99	Dec 99 – Jun 00	Oct 00 – Apr 01
KDP–4	Jul 99 – Jan 00	Apr 00 – Oct 00	Parameter Deleted
In-Service Decision	Parameter Added	Parameter Added	Jan 01– Jul 01
Production Begins	Sep 99 – Mar 00	May 00 – Nov 00	Parameter Deleted
1st Production FAT	Parameter Added	Parameter Added	May 01 – Nov 01
First ORD of IOC ITWS	Mar 00 – Sep 00	Sep 00 – Mar 01	Sep 01 – Mar 02
Last ORD of IOC ITWS	Jun 01 – Dec 01	Dec 01 – Jun 02	Jan 03 – Jul 03
Last ORD of End–State ITWS	Jun 05 – Dec 05	Parameter Deleted	nc

*Completed Milestone

SECTION D: BENEFITS BASELINE

Approved: 6/2/97*

KEY BENEFITS	VALUE	IOC Benefits ($ Millions)	P3I Benefits	Total Benefits	CHANGE #2/ 6/2/97 JRC	APPROVAL SIGNATURE DATE
Delay Benefits	Runway/airfield management during thunderstorms which enables controllers to limit the time which an airfield is closed, or to avoid closure altogether.	$355.0	$69.0	$424	Parameter added.	
	Arrival Transition Area (ATA) management which is analogous to above, which will allow better recognition of ATAs that will remain clear; and when ATAs which are closed can reopen.	$312.0	$61.0	$373	Parameter added.	
	Departure Transition Area (DTA) management provides a more accurate and timely knowledge of the time and location of storm cells to reduce delays.	$68.0	$13.0	$81	Parameter added.	
	Improved routing efficiency around storms enables controllers to direct and position arriving aircraft for more efficient arrivals.	$214.0	$65.0	$279	Parameter added.	
	Terminal area wind products increase TATCA effectiveness by providing wind data in situations where TATCA is unable to operate.	$35.0	$53.5	$88.5	Parameter added.	
	Wind shift product reduces delays caused by runway shifts by showing current location of wind shift lines within 35 nautical miles of the airport, forecast time of arrival at the airport, and magnitude at 5-minute intervals.		$24.9	$24.9	Parameter added.	
	Runway visual range (RVR) prediction and terminal ceiling/visibility products reduce delays associated with low ceiling/visibility conditions.		$127.3	$127.3	Parameter added.	

KEY BENEFITS	VALUE	IOC Benefits ($ Millions)	P3I Benefits	Total Benefits	CHANGE #2/ 6/2/97 JRC	APPROVAL SIGNATURE DATE
	Downstream impacts determine the effect on other airport operations when one airport is affected by weather.	$543.0	$118.8	$661.8	Parameter added.	
Travel Disruption Benefits	Avoided Diversions by providing near-real-time, accurate displays of terminal weather without the need for meteorological interpretation.	$634.0	$122.0	$756.0	Parameter added.	
	Avoided Missed Connections by providing better knowledge of the location and timing of storms enabling improved coordination of arriving and departing aircraft.	$50.7	$9.7	$60.4	Parameter added.	
Safety Benefits	Microburst prediction product reduces accident risk by providing up to two minutes lead time before hazardous low-altitude wind shear conditions arise.	$64.6		$64.6	Parameter added.	
	Lightning warning products reduces airport personnel casualties by including a lightning warning panel.	$5.5		$5.5	Parameter added.	
	Gust front shows the current location of fronts, provides short-term forecasts of frontal movement, and estimates the magnitude of the wind behind the front.				Parameter added.	
	Storm motion and extrapolated position enable tower supervisors to estimate the time of impact of hazardous weather.				Parameter added.	
	Other safety-related products provides a brief up-to-the-minute text description of the terminal weather situation to pilots approaching or taking off from an airport.				Parameter added.	

* Pending ASD-400 validation.

BENEFITS ($ Millions)*				
	Delay	Disruption	Safety	Total Benefits
1995	$0.0	$0.0	$0.0	$0.0
1996	$0.0	$0.0	$0.0	$0.0
1997	$0.0	$0.0	$0.0	$0.0
1998	$0.0	$0.0	$0.0	$0.0
1999	$0.0	$0.0	$0.0	$0.0
2000	$0.0	$0.0	$0.0	$0.0
2001	$60.0	$26.2	$2.8	$89.0
2002	$173.7	$75.9	$8.2	$257.8
2003	$281.4	$122.9	$13.3	$417.6
2004	$401.3	$172.3	$18.2	$591.8
2005	$515.0	$219.0	$22.8	$756.8
2006	$627.8	$263.2	$27.2	$918.2
2007	$752.3	$311.8	$31.4	$1,095.5
2008	$886.0	$364.2	$35.3	$1,285.5
2009	$1,012.8	$413.6	$39.0	$1,465.4
2010	$1,133.2	$460.3	$42.5	$1,636.0
2011	$1,247.5	$504.3	$45.9	$1,797.7
2012	$1,356.1	$545.9	$49.1	$1,951.1
2013	$1,459.3	$585.1	$52.1	$2,096.5
2014	$1,557.5	$622.1	$55.0	$2,234.6
2015	$1,649.4	$657.0	$57.7	$2,364.1
2016	$1,737.2	$690.0	$60.3	$2,487.5
2017	$1,821.2	$721.1	$62.7	$2,605.0
2018	$1,894.2	$750.5	$65.0	$2,709.7
2019	$1,963.2	$778.2	$67.2	$2,808.6
2020	$2,028.5	$804.4	$69.3	$2,902.2
2021	$2,059.4	$816.7	$70.3	$2,946.4
2022	$2,059.4	$816.7	$70.3	$2,946.4
Total	$2,059.4	$816.7	$70.3	$2,946.4

* Reported in cumulative present value discounted 1994 dollars.